Studies on Green Tea Oil-Based Microemulsions: Formulation, Characterization, and Cosmetic Applications"

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Abstract: -

The formulation and evaluation of green tea oil micro-emulsions represent a promising advancement in cosmetic applications due to their multifunctional properties. Green tea oil, rich in antioxidants such as catechins and vitamins, provides remarkable advantages for the skin, including anti-aging, anti-inflammatory, and hydrating properties. This study focuses on the development of stable and effective micro-emulsion systems without using co-solvent to encapsulate green tea oil natural ingredients, enhancing its bioavailability and stability in cosmetic formulations. However, EOs are unstable and hydrophobic, which limits its use. In the present study, we aimed for the preparation and characterization of a micro-emulsion (ME) from green tea essential oil (GTO) by phase titration method and application in cosmetics formulations. The particle size and zeta potential of the ME were 89.84±30.98 nm and 14.1±7.4 mV, respectively. The chemical composition and functional groups of GTO and ME were studied by using GC–MS analysis, portable Raman spectroscopy, and FTIR coupled with chemo-metric analysis. GC–MS analysis showed the major components in GTO and ME were n-Hexyl cinnamaldehyde and L- α-Terpineol. The both GTO and ME showed good antioxidant activity and total phenol content. To the best of our knowledge, this is the micro-emulsion prepare from the green tea oil natural ingredients and without using co-solvent. Green tea oil is naturally rich in antioxidant to help remove the acne, pimples, fine, wrinkles to helpful for the skin health. Additionally, in vitro studies demonstrated excellent skin penetration, antioxidant activity, and non-irritant properties of the developed micro-emulsions. These findings highlight the potential of green tea oil micro-emulsions as innovative and eco-friendly cosmetic products, addressing the increasing demand for sustainable and effective skincare solutions.

Keywords: Green tea oil, Antioxidant, Microemulsion, Cosmetics, Skincare

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